



Assessing the co-benefits of greenhouse gas reduction: health benefits of particulate matter related inspection and maintenance programs in Bangkok, Thailand

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Abstract:

Since the 1990s, the capital city of Thailand, Bangkok has been suffering from severe ambient particulate matter (PM) pollution mainly attributable to its wide use of diesel-fueled vehicles and motorcycles with poor emission performance. While the Thai government strives to reduce emissions from transportation through enforcing policy measures, the link between specific control policies and associated health impacts is inadequately studied. This link is especially important in exploring the co-benefits of greenhouse gas emissions reductions, which often brings reduction in other pollutants such as PM. This paper quantifies the health benefits potentially achieved by the new PM-related I/M programs targeting all diesel vehicles and motorcycles in the Bangkok Metropolitan Area (BMA). The benefits are estimated by using a framework that integrates policy scenario development, exposure assessment, exposure-response assessment and economic valuation. The results indicate that the total health damage due to the year 2000 PM emissions from vehicles in the BMA was equivalent to 2.4% of Thailand's GDP. Under the business-as-usual (BAU) scenario, total vehicular PM emissions in the BMA will increase considerably over time due to the rapid growth in vehicle population, even if the fleet average emission rates are projected to decrease over time as the result of participation of Thailand in post-Copenhagen climate change strategies. By 2015, the total health damage is estimated to increase by 2.5 times relative to the year 2000. However, control policies targeting PM emissions from automobiles, such as the PM-oriented I/M programs, could yield substantial health benefits relative to the BAU scenario, and serve as co-benefits of greenhouse gas control strategies. Despite uncertainty associated with the key assumptions used to estimate benefits, we find that with a high level confidence, the I/M programs will produce health benefits whose economic impacts considerably outweigh the expenditures on policy implementation.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution

Air Pollution: Particulate Matter

Geographic Feature:

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resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Thailand

Health Co-Benefit/Co-Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect, Other Health Impact

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): Cardiovascular hospital admissions

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : Respiratory hospital admissions; Chronic bronchitis; Acute respiratory symptom days

Other Health Impact: Restricted activity days; Emergency room visits

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction, Outcome Change Prediction

Population of Concern: A focus of content

Other Vulnerable Population: Infants

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Resource Type:

format or standard characteristic of resource

Policy/Opinion, Research Article

Timescale:

time period studied

Short-Term (

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content